Caltrans

CALTRANS SUBREGIONAL OPERATIONS FORUMS

Performance Management

Why Do Performance Measurement? (FHWA Perspective)

- Provide the most efficient investment of Federal transportation funds
- Refocus on national transportation goals
- Increase accountability and transparency
- Improve decision-making through performance-based planning and programming

Why Do Performance Measurement? (Internal Story)

- How will we get better? How do we compare?
- Allows operations to compete in idea marketplace
- Similar to other data intensive programs
- Tell a good story for budget justification
  - % of pavements in Good or better
  - # of structurally deficient bridges
  - *# of operating dynamic message signs….detectors …signals…*
- **Inform operations priorities**

MAP-21 Staged Rulemaking

NPRM DATE	MEASURE CATEGORY
STATUS I **NPRM 1Q '14** **Final 1Q '16**	✓ Serious Injuries per VMT
	✓ Fatalities per VMT
	✓ Number of Serious Injuries
	✓ Number of Fatalities
STATUS II **NPRM 1Q '15** **Final 2Q '16**	✓ Pavement Condition on the Interstates
	✓ Pavement Condition on the Non-Interstate NHS
	✓ Bridge Condition on NHS
STATUS III **NPRM 1Q '16** **Final May 2017**	• Traffic Congestion
	• On-road mobile source emissions*
	• Freight Movement
	• Performance of Interstate System
	• Performance of Non-Interstate NHS

Then, effective date, targets and reporting.

Relevant MAP 21 Measures

Interstate Travel Time Reliability Measure	% of person-miles traveled on the Interstate that are reliable
Non-Interstate Travel Time Reliability Measure	% of person-miles traveled on the non-Interstate NHS that are reliable
Peak Hour Excessive Delay	Annual hours of peak hour excessive delay per capita
Non-Single Occupancy Vehicle Travel	% of non-single occupancy vehicle travel
GHG	Still delayed
Freight Reliability Measure	Truck travel time reliability index

How are agencies here responding to MAP-21 requirements?

Who is responsible?

Is there a plan?

What are some other Transportation System Performance Measures?

SLOCOG US 101 Corridor Mobility Master Plan

- Where can operations help to support these principles?

Location Efficiency	• Support for Sustainable Growth • Transit Mode Share • Accessibility and Connectivity
Reliable Mobility	• Multimodal Travel Mobility • Multimodal Travel Reliability • Multimodal Service Quality
Health and Safety	• Multimodal Safety • Design and Speed Suitability • Pedestrian and Bicycle Mode Share
Environmental Stewardship	• Climate and Energy Conservation • Emissions Reduction
Social Equity	• Equitable Distribution of Impacts • Equitable Distribution of Access and Mobility
Robust Economy	• Congestion Effects on Productivity • Efficient use of System Resources • Network Performance Optimization • Return on Investment

Figure 6. Smart Mobility Framework Principles and Measures

Freeways & Intersections Projects	Multimodal Mobility Projects	TDM Programs	Network Improvement Projects
• Delay Savings • Emission Reduction • Crash Reduction • Travel Time Reliability	• VMT Savings • Delay Savings • Emission Reduction • Health	• VMT Savings • Emission Reduction	• VMT Savings • Emission Reduction

Figure 7. Benefit Criteria

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SLOCOG US 101 Corridor Mobility Master Plan

Table 3. Smart Mobility Performance Measures

Facility Type	Performance Measure	Indicator	Data Source	Tools
Freeway, Mainline	Access & Mobility	Density (pcplpm)*	Existing: Published Counts Future: SLOCOG Travel Demand Model	HCM 2010 Compatible Spreadsheets
Freeway, Merge-Diverge	Access & Mobility	Density (pcplpm)*	Existing: Published Counts Future: SLOCOG Travel Demand Model	HCM 2010 Compatible Spreadsheets
Freeway, Weave	Access & Mobility	Density (pcplpm)*	Existing: Published Counts Future: SLOCOG Travel Demand Model	Nomograph 504.74 of the Highway Design Manual
Freeway	Safety	Collision Rates	Existing: TASAS & SWITRS Future: Caltrans Table B	Spreadsheet; HSM Methods;
Freeway	Emissions	GHG emissions	SLOCOG Travel Demand Model; HPMS VMT	EMFAC2011
Arterial	Access & Mobility	Segment volume/capacity ratio	SLOCOG Travel Demand Model	SLOCOG Travel Demand Model
Arterial	Access & Mobility	Intersection LOS	Local Agency TIAs; New Traffic Counts; TASAS and SWITRS	SYNCRO; HCM 2010;
Transit	Connectivity	Park & Ride Usage to Capacity	SLOCOG Park and Ride Study	SLOCOG Park and Ride Study
Transit	Quality of Transit Network	Population Served	American Community Survey	GIS
Bicycle	Quality of Bicycle Network	Bicycle Network Connectivity	Local and Regional Plans	GIS
Pedestrian	Quality of Pedestrian Network	Pedestrian Network Connectivity	Google; Public Input	GIS

Types of Measures

Outcome

- Safety
- Delay
- Reliability
- Incident response
- Incident duration
- Mode shift
- Person throughput
- Cost savings

Activity (output)

- Traffic volumes
- Person/vehicle throughput
- 511 calls
- Web site visits
- Incident clearance time
- Number of trainings attended
- Number of projects brought in on schedule
- Quantity of ITS devices

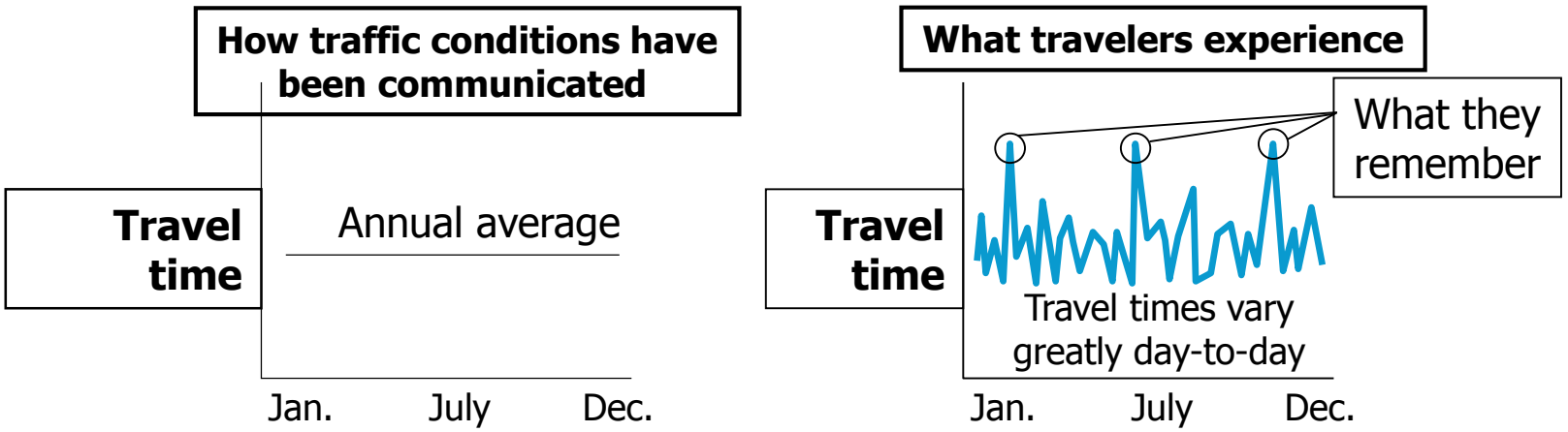
But what about other important measures?

- Work zones
- Planned special events
- Responses to weather conditions
- Device reliability
- Customer satisfaction

Why Is Reliability Important?

- Less tolerance for unexpected delay
- Travelers are familiar with routes they travel often
- Planning for unreliable travel has costs for users – late & early arrivals!
- Economic competitiveness
- Valued service in other utilities & industries
  - Deliveries (FedEx, UPS)
  - Freight/goods movement

Averages Don't Tell the Full Story



When MnDOT's ramp meters were turned off in 2000:

- 22 percent worse average travel times
- 91 percent worse travel time reliability

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Caltrans Freeway Performance Measurement System (PeMS)

- Based on Vehicle Detection Stations (VDS) – sensors (mostly inductive loops imbedded in pavement)
- Algorithms allow for various performance measurements
- When sensors are not working, PeMS uses imputation (e.g., interpolation) to estimate for missing data

Corridor Perf. Meas. using PeMS

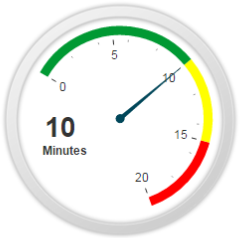
- **System Management Performance Measurement**
  - Ramp metering (balance and optimize metering rates)
  - HOV/Managed lanes (manage effectiveness and violations)
  - Ramp intersection traffic signals (efficient control of flows)
  - Integrated Corridor Management (ICM for all transportation)
- **Corridor Monitoring Performance Measurement**
  - Demand (VMT) and throughput (flows or volume rates)
  - Congestion (VHT, delays, peak periods, queue lengths)
  - Bottlenecks (capacities, flow against capacities)
  - Travel (travel times)
- **Incident Management Performance Measurement**
  - Reliability (travel time variability, buffer or planning time index)
  - Non-recurrent congestion (delay, duration, queue lengths)
  - Incident and collision locations and frequency

Examples of Performance Reports

…and how other agencies use performance data to build the case for supporting TSMO

- **GDOT HERO Incident Response Times**
- Explaining Agency Performance

Average HERO Response Time



Description

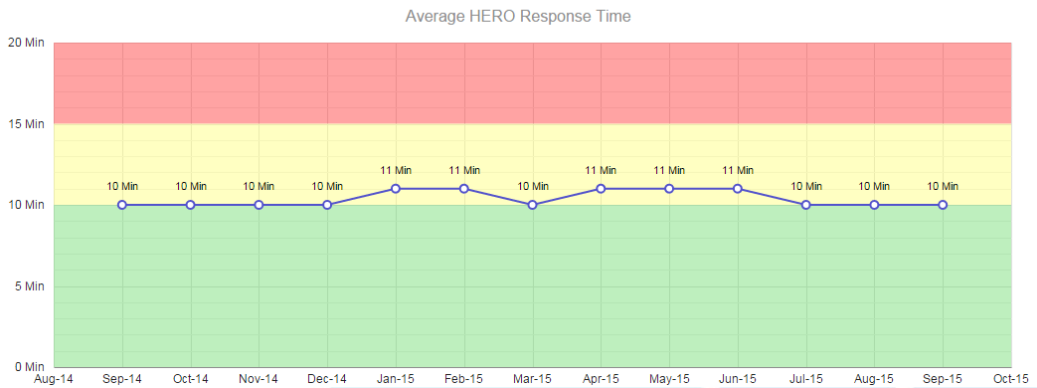
A roadway incident can delay traffic and present a hazard to travelers. By clearing a blocked lane one minute sooner, we could save our traveling public 4 to 6 minutes of delay. This measure tracks the time it takes a HERO unit to reach the scene from the time of notification.

Strategic Objective

Reduce the time that the traveling public is impeded by incidents. The target is to reduce incident response time to 10 minutes or less.

Road to Improvement

GDOT is exploring options to add additional HEROs to corridors with the highest incident rates. In addition, the new Automated Location and Dispatch System (ALADS) allows operators at the TMC to see the exact HERO truck locations on a map. This helps ensure that the closest HERO is dispatched to an incident; thereby further reducing response times. The average response time for FY 2014 was 13 minutes.



http://www.dot.ga.gov/BuildSmart/performance/Pages/HEROResponseTime.aspx

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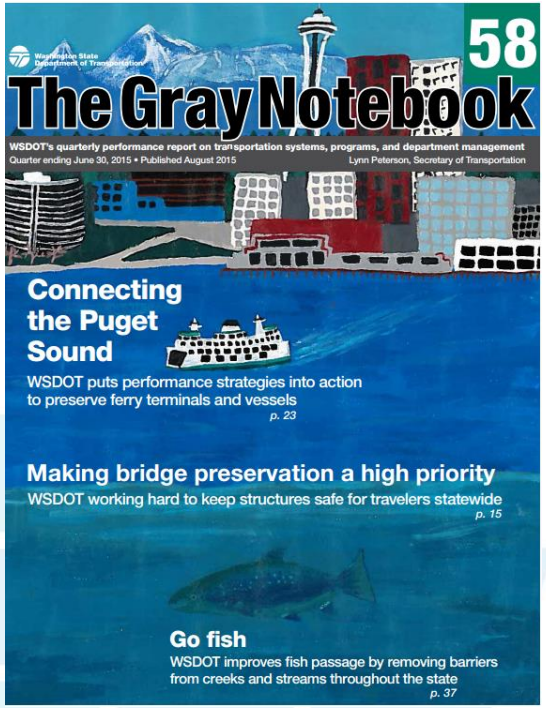
WSDOT's *Gray Notebook*

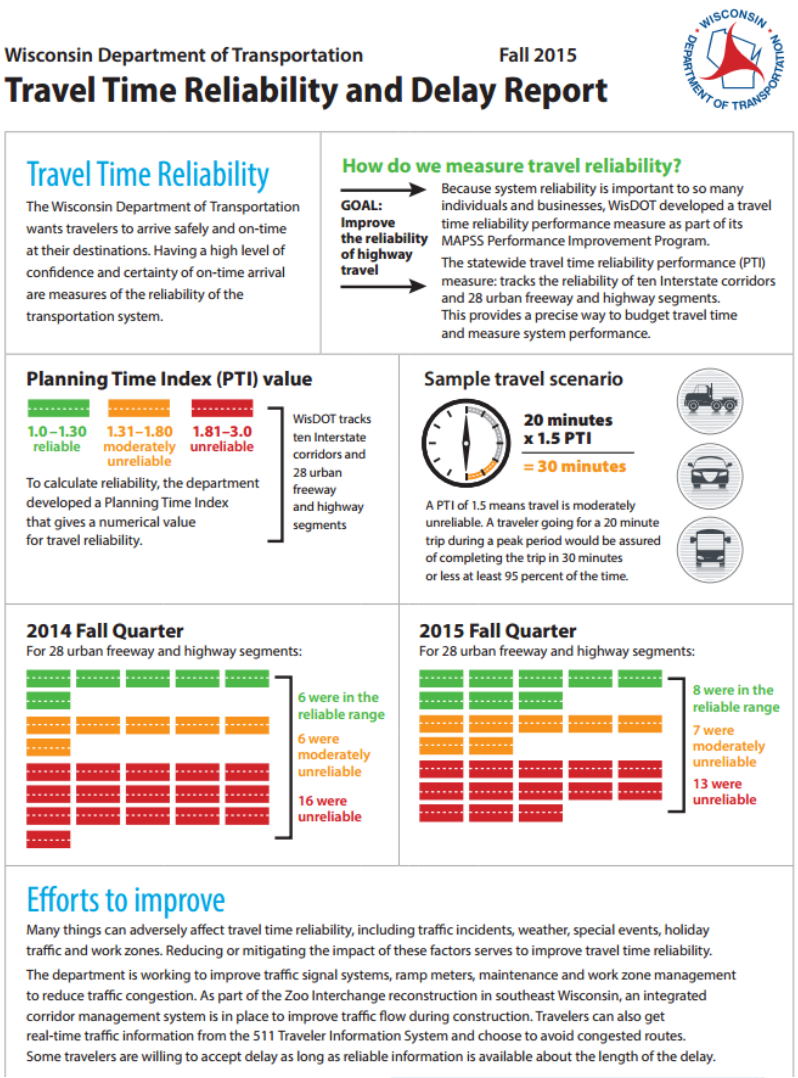
- WSDOT's Strategic Approach since April 2001
  - Accountability & Transparency
  - Comprehensive Performance Analysis and Reporting
  - Adaptive and Dynamic Performance Measurement
- Communicating Two Simple Themes:
  - Accountability
  - Project Delivery

  http://www.wsdot.wa.gov/accountability/



Wisconsin DOT

- Reliability and Delay Report
- Part of Five Key Goals for the Department
- Efficiency, cost, and trending improvements
- Delay, Reliability, Incident Response
- http://wisconsindot.gov/Pages/about-wisdot/performance/mapss/goalmobility.aspx



Wisconsin Department of Transportation Fall 2015

Travel Time Reliability and Delay Report

Travel Time Reliability

The Wisconsin Department of Transportation wants travelers to arrive safely and on-time at their destinations. Having a high level of confidence and certainty of on-time arrival are measures of the reliability of the transportation system.

How do we measure travel reliability?

GOAL: Improve the reliability of highway travel

Because system reliability is important to so many individuals and businesses, WisDOT developed a travel time reliability performance measure as part of its MAPSS Performance Improvement Program.

The statewide travel time reliability performance (PTI) measure: tracks the reliability of ten Interstate corridors and 28 urban freeway and highway segments. This provides a precise way to budget travel time and measure system performance.

Planning Time Index (PTI) value

1.0–1.30 reliable | 1.31–1.80 moderately unreliable | 1.81–3.0 unreliable

To calculate reliability, the department developed a Planning Time Index that gives a numerical value for travel reliability.

WisDOT tracks ten Interstate corridors and 28 urban freeway and highway segments

Sample travel scenario

20 minutes x 1.5 PTI = 30 minutes

A PTI of 1.5 means travel is moderately unreliable. A traveler going for a 20 minute trip during a peak period would be assured of completing the trip in 30 minutes or less at least 95 percent of the time.

2014 Fall Quarter

For 28 urban freeway and highway segments:

6 were in the reliable range
6 were moderately unreliable
16 were unreliable

2015 Fall Quarter

For 28 urban freeway and highway segments:

8 were in the reliable range
7 were moderately unreliable
13 were unreliable

Efforts to improve

Many things can adversely affect travel time reliability, including traffic incidents, weather, special events, holiday traffic and work zones. Reducing or mitigating the impact of these factors serves to improve travel time reliability.

The department is working to improve traffic signal systems, ramp meters, maintenance and work zone management to reduce traffic congestion. As part of the Zoo Interchange reconstruction in southeast Wisconsin, an integrated corridor management system is in place to improve traffic flow during construction. Travelers can also get real-time traffic information from the 511 Traveler Information System and choose to avoid congested routes. Some travelers are willing to accept delay as long as reliable information is available about the length of the delay.

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Houston SAFEClear Rapid Towing Response

- Response time holds towing companies responsible (90% within 6 minutes)
- Clearance time & crash reduction used to justify City expenditures (10% crash reduction)
- Reduction in secondary crashes an important component of public support
- $5M program => $30+M crash reduction

The Operations Performance Measurement Plan

- Fewer measures are better
  - "Measure like you mean it"
- Choose measures that are understandable to intended audience
  - Internal staff and bosses
  - General public & decision makers
- Get started now, use current data and I.T.
- Focus on known and big problems; estimate the rest

Lessons for Plan Development: Getting Started

- Get the key people involved from the start and keep them “in the loop”
  - Includes senior-level people involved in transportation planning and programming
- Allocate plenty of time for developing consensus goals
  - Write a memo – spend 2 years implementing
  - …or, spend 6 months gaining consensus, implement along the way

Key Considerations

- What are the most important stories?
  - What do the audiences need to know?
- How do the measures connect with the likely decisions and investment options?
- What are the most important measures? (Recognizing there will be many measures).
- Where does the data come from?
- What is the “ask”? (“what they do after they hear you”)

Resources

Operations Performance Measures: Resources

- FHWA Operations Performance Measures Website
  - Urban Congestion Reports (quarterly and annual), Program Examples
    - http://www.ops.fhwa.dot.gov/perf_measurement/index.htm
- Other Sources
  - AASHTO Standing Committee on Performance Measures
  - TRB Performance Measurement Committee
  - I-95 Corridor Coalition Probe Vehicle Data Project/Performance Measures Project